REMARKS

Claims 1-15 are present in this application. Claims 1, 10, 11, and new claim 15 are independent.

Allowable Subject Matter

Applicants thank the Examiner for indicating that claim 2 contains allowable subject matter.

Claim Rejection under 35 USC 102(b) - Ueda

Claims 1, 4, 5, 7, 8, and 10-14 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,796,470 (Ueda). Applicants respectfully traverse this rejection.

Claim 1 is directed to an embodiment related to an optical moving amount detecting device. The optical moving amount detecting device (e.g., Fig. 1) includes, among other things,

a light emitter (11),

a light receiver (17),

a first optical system (12, 13) for making light from the light emitter into a linear beam having a length and a width, the length extending in parallel with a direction of movement of a detection object (e.g., see Fig. 2) and casting the linear beam on the detection object,

a second optical system (32) by which a linear reflected beam that is the linear beam reflected from the detection object is made incident on the light receiver,

a storage unit for storing first output waveform signals that are outputted from the light receiver receiving the linear reflected beam at a first time point and that represent an output distribution of the linear reflected beam along a longitudinal direction thereof and storing second output waveform signals that are outputted from the light receiver receiving the linear reflected beam at a second time point and that represent an output distribution of the linear reflected beam along the longitudinal direction thereof, and

a moving amount detecting unit (34) for detecting an amount of shift between the first output waveform signals and the second output waveform signals in the longitudinal direction of the linear reflected beams and detecting a moving amount of the detection object on basis of the amount of shift.

The present application defines the claimed "amount of shift" with respect to figures 5A, 5B, 6A, and 6B. According to the present specification at page 21, the "output values generally identical to those from the first partial area 22a appear in the second partial area 22b. A shift between the first partial area 22a and the second partial area 22b is calculated on basis of positions of the photodetectors 17a, and a moving amount is thereby detected." As can be seen in Figs. 6A and 6B, the output waveform signals show a movement of a characteristic pattern along the movement direction of the object. The movement of the characteristic pattern between two time points is used to determine the "amount of shift."

Claim 10 is directed to an optical movement detector for detecting movement of a detection object. Claim 11 is directed to a method optically detecting an amount of movement of an object.

The rejection alleges that Ueda's light source element 1 teaches the claimed light emitter, Ueda's photo detector 9 teaches the claimed light receiver, Ueda's lens units 11, 12 teach the claimed first optical system, Ueda's condenser lens 8 and lens unit 12 teach the claimed second optical system, Ueda's cpu teaches the claimed storage unit storing first output waveform signals, e.g., 5a, and second output waveform signals, e.g., Fig. 2B, and that a section at column 1, line 56, to column 2, line 12, teaches the claimed moving amount detecting unit.

Applicants submit that the invention disclosed in Ueda is significantly different from the claimed invention. The invention disclosed in Ueda makes use of a Doppler effect.

Requirement for Anticipation

Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir.); cert. Dismissed, 468 U.S. 1228 (1984); W.L. Gore and Assoc., Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983), cert. Denied, 469 U.S. 851 (1984).

At the outset, Applicants submit that the rejection appears to confuse the claimed "detecting an amount of shift" with a Doppler frequency shift. Ueda makes use of Doppler effect. Doppler effect is the apparent change in frequency that is perceived by an observer moving

relative to the source of the waves. Although the present invention does determine position at different time points, the present invention is for a short distance between the detecting device and the detection object, and thus does not rely on differences in frequency from Doppler effect.

Ueda discloses an optical displacement apparatus that does not make measurements over two points in time. Instead, the invention disclosed by Ueda determines velocity of an object by irradiating an object with two light beams in order to obtain a Doppler frequency (col. 6, lines 42-53). Ueda's main contribution is a frequency shifting component that compensates for variations in temperature (Fig. 2A includes an additional temperature compensating frequency shifter 101 that is not shown in prior art Fig. 1A).

As noted above, embodiments of the present invention project a linear beam that has a length along the direction parallel to the direction of movement of the detection object (see Fig. 2, where α represents the direction of movement). Based on images of the light beam taken at two points in time, a characteristic pattern in the output waveform signals shifts by a certain amount (e.g., see Figs. 6A and 6B). Embodiments of the present invention determine the amount of shift of the characteristic pattern using a moving amount detecting unit.

Ueda detects frequency difference between two light beams, determines a Doppler frequency, and uses the Doppler frequency to detect velocity of a moving object (col. 6, lines 26-53). Applicants submit that Ueda's lens units 11, 12 do not form a linear beam having length and width, the length extending in parallel with a direction of movement of a detection object. Furthermore, Ueda's cpu is not disclosed as storing first output waveform signals that are outputted from the light receiver receiving the linear reflected beam at a first time point and storing second output waveform signals that are outputted from the light receiver at a second time point. In addition, despite the indication in the rejection, Ueda's beam 5a is not the output of the photodetector 9, and thus does not constitute an output waveform signal that is output from light receiver. Subsequently, Ueda does not teach the claimed moving amount detecting unit for detecting an "amount of shift."

Thus, Applicants submit that Ueda fails to teach at least the claimed first optical system, storage unit and moving amount detecting unit. Applicants request that the rejection be reconsidered and withdrawn.

Claim Rejection under 35 USC 102(b) - Brosnan

Claims 1, 3-6, and 10 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,610,705 (Brosnan). Applicants respectfully traverse this rejection.

The rejection relies on Figures 1 and 2 of Brosnan for teaching claimed elements. In particular, the rejection alleges that Brosnan's statement, "an illumination laser 10 that illuminates a moving object with a coherent laser beam 12" teaches the claimed first optic system for making light from the light emitter into a linear beam having a length and a width, the length extending in parallel with a direction of movement of a detection object and casting a linear beam on the detection object. The rejection alleges that Brosnan's light receiver 24, light amplifier 36, and frequency counter 38 constitute the claimed moving amount detecting unit.

Applicants submit that Brosnan fails to teach a first optical system that casts a linear beam on the detection object, the linear beam extending in parallel with a direction of movement of a detection object (see, for example, present Fig. 2). In particular, Brosnan does not disclose an optical system between the illumination laser 10 and the detection object. In addition, Applicants submit that Brosnan fails to teach the claimed moving amount detecting unit for detecting an amount of shift between the first output waveform signals and the second output waveform signals in the longitudinal direction of the linear reflected beams and detecting a moving amount of the detection object on basis of the amount of shift. Unlike the present invention, Brosnan's velocimeter makes use of Doppler effect. The claims recite "detecting an amount of shift." Although the present invention does determine position at different time points, the present invention is for a short distance between the detecting device and the detection object, and thus does not rely on Doppler effect.

Brosnan discloses a heterodyne velocimeter system. In other words, Brosnan discloses a velocity measuring system that mixes a local oscillator wave with signal light at the sensor surface (see col. 1, lines 31 to 40). In particular, Brosnan is directed to determining velocity of a moving object that relies on Doppler frequency shift over a temporal window. Brosnan's velocimeter system performs an operation based on a difference between two frequencies. Velocity is measured based on the product of a difference frequency and the laser wavelength. (col. 6, lines 35-44).

Unlike Brosnan's velocity determining technique, the present invention preferably determines a shift based on a partial area that has moved from a first position to a second position (para. 0058; Figs. 5A, 5B; Figs. 6A, 6B). In other words, embodiments of the present invention detect a shift in position of a partial area reflected from an image of the linear beam along the direction of movement of a detection object. The present invention does not determine a Doppler frequency shift. Thus, Applicants submit that Brosnan fails to teach at least the claimed moving amount detecting unit from detecting an "amount of shift between the first output waveform signals and the second output waveform signals in the longitudinal direction of the linear reflected beams."

Thus, Applicants submit that Brosnan fails to teach each and every claimed element. Applicants request that the rejection be reconsidered and withdrawn.

New Claim

Claim 15 has been added. The two references relied on in the Office Action use Doppler shift. New claim clarifies the distinction between "amount of shift" and Doppler shift. Applicants submit that new claim 15 is patentable over Ueda and Brosnan, which are directed to devices based on Doppler effect.

CONCLUSION

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), the Applicants respectfully petition for a one (1) month extension of time for filing a response in connection with the present application and the required fee of $120.00 is being filed concurrently herewith.

Should the Examiner have any questions regarding this matter, she is respectfully requested to contact Robert W. Downs (Reg. No. 48,222), who may be reached in the Washington, DC, area at (703) 205-8000.

If necessary, the Commissioner is hereby authorized in this concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

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Respectfully submitted,

By _____ #29271
(RWD)

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